9/11 Terror

Muslims Suspend Laws of Physics!

Part II

by J. McMichael
jmcmichael@care2.com

Part I was originally available at
http://world.care2.com/jmcmichael/files/index.html
and on this ***9-11 Review*** site here.

Some of the references in the original have gone off-line since it was written.

Some people have written to me (or commented publicly) that the collapse of the World Trade Center was a perfectly normal event caused by the heat of the fire.

Let me recall a few details to the reader's attention before answering that statement.

Citing structural engineer Chris Wise, the BBC web page stated that steel supports in the WTC reached 1500 degrees Fahrenheit and melted (http://news.bbc.co.uk/hi/english/world/americas/newsid_1540000/1540044.stm). That is of course not correct, and I provided a link to an on-line chemistry chart to show that steel melts closer to 2800 degrees F.

Note that the statement (that the WTC steel melted) is not mine: The statement comes from the BBC page, citing Chris Wise, and from others on television.

The critics have pointed out that steel does not MELT at 1500 F, but it does soften and lose its strength, enough to cause the towers to collapse. We are asked to believe, as one Australian put it, that steel supports turn to licorice when heated in a fire.

Corus Steel is a trans-national corporation that markets structural steel (http://www.corusconstruction.com/). One graph on their web page shows the diminishing strength of steel as it is heated. http://www.corusconstruction.com/fire/fr006.htm mirrored at http://www.911review.com/articles/jm/cache/fr006.htm.

Note that structural steel at 550 degrees C (1022 F) has 60% of the strength of steel at normal temperatures. This weakening of steel when heated is supposedly responsible for the catastrophic collapse of the towers. The statement generates three questions to be answered in order to determine whether this phenomenon could cause the collapse of the World Trade Center:

1. How much strength would the steel have to lose for the WTC to collapse?

2. What temperature would the steel have to reach to occasion this loss of strength?

3. What was the temperature of the fire in the WTC; i.e., did it reach the critically weakening temperature?

Question 1:

In the original article, I cited my own experience that a support device must be capable of bearing three times the maximum load that would ever be applied.

It turns out that this rule-of-thumb is applicable only to dynamic loads, not static (structural) loads of commercial buildings. Since then, I have been informed by a commercial structural engineer that the standard ratio for static loads is five, not three. That is, if a bridge is rated to carry 1 ton, it should be capable of bearing 5 tons without collapsing at the time the bridge is built.

Going back to the fire at the WTC, we can see that reducing the steel structure to 60% its rated strength should NOT have weakened it to catastrophic collapse, because at 60% it would still support three times the rated load. The steel structure would have to be reduced to 20% of its rated strength to collapse.

Thus, even if the fire had heated the steel to 550 degrees C (1022 F), that would not have been sufficient to cause the towers to collapse.

Question 2:

The Corus page on fire vs. steel supports (http://www.corusconstruction.com/fire/fr006.htm mirrored at http://www.911review.com/articles/jm/cache/fr006.html) shows that the steel would have to be heated to about 720 degrees C (1320 F) to weaken the steel to 20% of its cool strength.

The text on that page discusses another change in the steel above 550 degrees C (1022 F): It looses elasticity and becomes plastic. Elasticity means that when the steel is bent, it returns to its original shape; it springs back. Plasticity means that the steel is permanently deformed and does not spring back to the original shape.

Springing back or not, our only concern with this page is to determine the point on the graph where the steel would be weakened to 20% its original strength, and that point is 720 degrees C (1320 F).

For steel, 550 degrees C (1022 F) is an important threshold, however, and we should not be glib with it. If a steel tower were heated to 550 C, loss of elasticity could mean that the tower would not spring back to the original shape after a gust of wind, and a series of buffets might cause the tower to fail -- if the strain exceeded the reduced strength of the hot steel.

Question 3:

Now let us make a guess on the actual heat of the fire.

Fortunately, a number of studies have been done under very similar conditions. In Europe, multi-storied "car parks" are often built of steel, and the possibility of vehicle fire is a distinct possibility. A parked vehicle, loaded with gasoline, diesel, tires, engine oil, engine tar, upholstery, hydraulic fluid, etc. can cause a fire that seems very hot. A number of other vehicles could be parked close to the burning one, and they too could catch fire, with a general conflagration. Any number of cars could contain almost any household items from shopping, etc.

These materials are similar to the materials we would expect in the burning offices of the WTC: jet fuel (which is a refined kerosene, very similar to the diesel used in some European cars), oil, upholstery, etc.

A summary of the results of these studies is published on the Corus page. Go to http://www.corusconstruction.com/ and click on "Fire". Individual articles are listed across the top of the window. The fourth article, "Fire in Car Parks," discusses the temperatures of "any fires that are likely to occur" in a car park (http://www.corusconstruction.com/carparks/cp006.htm mirrored at http://www.911review.com/articles/jm/cache/cp006.htm).

Presumably, one car could catch fire and inflame other cars parked closely nearby. As explained below, "The maximum temperatures reached [in actual test fires] in open sided car parks in four countries" was 360 degrees C (680 F), and structural steel has "sufficient inherent resistance to withstand the effects of any fires that are likely to occur."

Here is the relevant paragraph, complete: "Steel-framed car parks have been rigorously fire tested in a number of countries (Table 3). These tests demonstrate that most unprotected steel in open sided steel-framed car parks has sufficient inherent resistance to withstand the effects of any fires that are likely to occur. Table 3 lists the maximum temperatures reached in open sided car park tests in four countries. These can be compared with the characteristic failure temperatures for beams carrying insulating floor slabs and columns of 620 [degrees] C and 550 [degrees] C respectively."

Note that the description does not limit the duration of the fire. From this it does not appear to matter whether the fire burned all week or just for two hours. No mention is made, as some people have suggested (from erroneous interpretation of other graphs involving time), that prolonged heat brings about progressive weakening of steel.

Here is the data from Corus' Table 3 (beams are horizontal members, columns are vertical):

Full scale fire tests	Maximum measured steel temperature	
Country	Beam	Column
UK	275 C (527 F)	360 C (680 F)
Japan	245 C (473 F)	242 C (467 F)
USA	226 C (438 F)	-
Australia	340 C (644 F)	320 C (608 F)

A fire in a steel car park is a very imprecise event, and the heating of the steel supports varied widely in the tests. The temperature of (horizontal) beams varied from 226 C in the USA to 340 C in Australia; and the temperature of (vertical) columns varied from 242 C in Japan to 360 C in the UK. None of the steel was protected with the thermal insulation that is commonly used in office buildings, including the WTC.

To my mind, this is definitive answer: the maximum temperature in the unprotected steel supports in those test fires was 360 degrees C (680 F), and that is a long way from the first critical threshold in structural steel, 550 degrees C (1022 F).

Some may argue that there was much more fuel involved in the WTC events that in a car park. There was also much more steel involved, the support columns were more massive, and they were protected with insulation.

I think the case is made: The fire did not weaken the WTC structure sufficiently to cause the collapse of the towers.

— J. McMichael

Detailed information of the construction World Trade Center (with many photographs) can be found at http://www.GreatBuildings.com/buildings/World_Trade_Center.html